Citation:

Malik VS, Schulze MB, Hu FB. Intake of sugar-sweetened beverages and weight gain: a systematic review. *Am J Clin Nutr* 2006 (84):274-88.

PubMed ID: 16895873

Study Design:

Systematic Review

Class:

M - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

The purpose of the review was to critically examine the current evidence for an association between intake of sugar-sweetened beverages and weight gain and obesity.

Inclusion Criteria:

- English-language articles
- Published between 1966 and May 2005
- Cross-sectional, prospective, or experimental study
- Articles that included ≥ 1 endpoint evaluating body size or weight (BMI or weight)
- Duration of ≥ 6 months for prospective studies

Exclusion Criteria:

- Non-English language articles
- Articles that did not include end points evaluating body size or weight

Description of Study Protocol:

Recruitment: not applicable

Design: Systematic review. English-language MEDLINE publications from 1966 through May 2005 examining the relation between SSBs and the risk of weight gain, obesity, or both were examined. Key words such as “soda,” “soda pop,” and “sugar-sweetened beverage” hedged with “weight gain,” “overweight,” and “obesity” were used in the primary search strategy, as well as in a subsequent search using MeSH terms. Additional published reports were obtained by cross-matching references of selected articles. Only cross-sectional, prospective, and experimental studies were included in the review. Greater weight was given to large cross-sectional studies with

> 10,000 participants, prospective cohort studies, and experimental interventions with longer follow-up and large numbers of participants.

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis: not completed

Data Collection Summary:

Timing of Measurements: Not applicable

Dependent Variables:

- Weight gain and obesity

Independent Variables:

- Intake of sugar-sweetened beverages - SSBs included soft drinks, soda, fruitades, fruit drinks, sports drinks, sweetened iced tea, squashes, and lemonade.

Control Variables

Description of Actual Data Sample:

Initial N: 30 articles were included (15 cross-sectional, 10 prospective cohort, and 5 clinical trials or interventions). Two studies reported both prospective and cross-sectional findings.

Sample sizes of individual studies varied from as few as 15 in a crossover study to as many as 16,679 in a cross-sectional study.

Attrition (final N): as above

Age: Age of participants in the 30 studies ranged from children to adults. Studies of children had a defined age range but this range varied from study to study. Those studies that included adults also had variable age ranges.

Ethnicity:Varied for each study included in the review

Other relevant demographics: Varied for each study included in the review

Anthropometrics: Varied for each study in the review

Location: International studies

Summary of Results:

Key Findings:

Cross-sectional studies (n=15):

- Six of the studies of children and adolescents found a significant positive association between the intake of sugar-sweetened beverages and overweight or obesity.
- Three studies suggested positive associations, although the associations were not significant
- Three studies found no significant association between intake of sugar-sweetened beverages and overweight or obesity.
- One study had inconsistent findings
- Two studies had noteworthy findings and showed a positive association between increased weight/BMI and sugar-sweetened beverages.

Prospective cohort studies (n=10):

- Four of the studies in children and adolescents found a significant positive association between the intake of sugar-sweetened beverages and greater overweight or obesity.
- Two studies in children found nonsignificant associations between the intake of sugar-sweetened beverages and BMI.
- Four studies in adults had varying results: Two found an association between intake of sweetened beverages and overweight or obesity, one found a positive but non-significant association, and one found no significant association.

Experimental trials and interventions (n=5):

- Three short-term feeding trials in adults supported the hypothesis that intake of sugar-sweetened beverages are positively associated with weight gain and obesity.
- Two studies of children showed a positive relationship between sugar-sweetened beverages and obesity and overweight.

Author Conclusion:

The weight of epidemiologic and experimental evidence indicates that a greater consumption of SSBs is associated with weight gain and obesity. Although more research is needed, sufficient evidence exists for public health strategies to discourage consumption of sugary drinks as part of a healthy lifestyle.

Reviewer Comments:

- *The authors caution that the interpretation of the data is complicated by several method-related issues, including small sample sizes, short duration of follow-up, lack of repeated measures in dietary exposures and outcomes, and confounding by other diet and lifestyle factors.*
- *The authors did not evaluate the quality of each study included in the review.*
- *It is difficult to determine from this review how similar articles were in the types of sugar-sweetened beverages that were studied. Some studies included only sodas while others included other types of sugar-sweetened beverages.*

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions

1.	Will the answer if true, have a direct bearing on the health of patients?	Yes
2.	Is the outcome or topic something that patients/clients/population groups would care about?	Yes
3.	Is the problem addressed in the review one that is relevant to nutrition or dietetics practice?	Yes
4.	Will the information, if true, require a change in practice?	Yes

Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search termsused described?	Yes
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	Yes
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	No
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	Yes
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issued considered? If data from studies were aggregated for meta-analysis, was the procedure described?	???
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes